

CROP TALK

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Brought to You by the Following OMAFRA Crop Specialists

Mike Cowbrough, Weed Management Program Lead
Hugh Martin, Organic Crop Production Program Lead
Horst Bohner, Soybean Specialist
Ian McDonald, Applied Research Coordinator
Albert Tenuta, Field Crop Pathologist
Jack Kyle, Grazier Specialist
Brian Hall, Canola & Edible Beans Specialist
Peter Johnson, Cereals Specialist
Scott Banks, Emerging Crops Specialist
Gilles Quesnel, Field Crops, IPM Program Lead
Christine Brown, Nutrient Management Program Lead
Adam Hayes, Soil Management Specialist - Field Crops
Greg Stewart, Corn Industry Program Lead
Tracey Baute, Field Crop Entomology

Editor: *Joel Bagg, Forage Specialist*
Compiled by: Linda Cooper, OMAFRA, Brighton

Soybean Leaf Feeding?

by Horst Bohner, Soybean Specialist and Tracey Baute, Field Crop Entomologist, OMAFRA

Early-season leaf feeding before the 3rd trifoliate can look serious because plants are small. However, soybeans can compensate for large amounts of leaf loss with little impact on yield. Soybeans will put on new leaves quickly at the top of the plant and unaffected leaves actually grow larger to compensate. Before the plants begin to flower, up to 100% of the leaves can be removed with almost no yield loss if the rest of the growing season is favourable. If the plant is cut off below the cotyledons it will not recover. Once the plant starts to flower (growth stage R1), leaf feeding becomes more critical because the plants requirements from photosynthesis increase. (Refer to Table 1.) There are two main spring leaf feeding culprits of soybeans in Ontario. These are slugs and bean leaf beetles.

Slugs

Slug feeding can resemble hail damage, but damaged leaves have more of a "skeleton" appearance. Refer to Photo #1. Slugs feed on leaves, but they can also feed on germinating seeds, hollowing them out before they can emerge. There is one generation per year but two populations - one maturing as adults in the spring and one maturing as adults in the fall. Slugs are most active during cool and wet periods, and prefer environments with high humidity and cool temperatures. Crop residue or manure provides shelter from the sun.

Photo 1. Slug feeding

Table 1 Percent Yield Loss of Indeterminate Soybean at Various Levels of Leaf Area Loss and Growth Stages

	Percent Leaf Area Destroyed									
Growth Stage	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
Vc-Vn	–	–	–	–	–	–	–	–	–	–
R1	–	1	2	3	3	4	5	6	8	12
R2	–	2	3	5	6	7	9	12	16	23
R2.5	1	2	3	5	7	9	11	15	20	28
R3	2	3	4	6	8	11	14	18	24	33
R3.5	3	4	5	7	10	13	18	24	31	45
R4	3	5	7	9	12	16	22	30	39	56
R4.5	4	6	9	11	15	20	27	37	49	65
R5	4	7	10	13	17	23	31	43	58	75
R5.5	4	7	10	13	17	23	31	43	58	75
R6	1	6	9	11	14	18	23	31	41	53
R6.5	4	7	10	13	17	23	31	43	58	75
Source: National Crop Insurance Services Inc., 1997.										

Slug Control

- Tillage can be used against slugs, since the reduction of the crop residues on the surface exposes the slugs to dehydration. Plowing is not necessary. Vertical tillage (RTS, Turbo-till, etc.) in the spring can reduce slug numbers. Zone tillage or row sweepers also helps reduce spring feeding.
- Planting into conditions that help the crop to grow quickly can avoid heavy damage. Waiting to seed later in the spring can reduce damage if the field is known to have high slug numbers.
- There are no economical chemical methods available in field crops. Slug baits are available but are expensive and are only recommended for use in small problem areas. Experiments with 28% nitrogen/water mixtures or foliar potash applications have proven to be inconsistent.

Bean Leaf Beetles (BLB)

Adult feeding appears as small round holes between the veins of the leaves. Cotyledons and seedling plants can be clipped off by heavy populations. Late-season pod feeding can also be a problem. Bean leaf beetles feed on the surface of the pod, leaving only a thin film of tissue to protect the seeds within the pod. These pod lesions increase the pod's susceptibility to secondary pod diseases such as alternaria. Pods may also be clipped off the plant, but this is not the primary cause of yield loss. The most important concern is that BLB is a vector of bean pod mottle virus. This virus causes the plant and seed to become wrinkled and mottled, reducing the quality of the seed.

The bean leaf beetle can be confused with other insects, such as the lady beetle. The way to distinguish a BLB is by the small black triangle behind the head. Bean leaf beetle adults vary in colour, but always have a small black triangle visible behind the head. They may or may not have four spots, and are about 5 mm (1/5 in.) in length. Refer to Photo #2.

Photo 2. Bean leaf beetle

BLB Control

- CruiserMaxx seed treatment does an excellent job to control early season feeding. Fields with a history of bean leaf beetles should be planted with treated seed.
- If early season numbers are high enough to clip off plants below the cotyledon, the field should be sprayed. If leaf feeding exceeds 30% before flowering and 15% during flowering, then a foliar pesticide application is warranted. Matador, Silencer, Lagon, and Cygon are registered for the control of bean leaf beetle
- For late-season feeding (pod fill to maturity), the action threshold is 25% leaf feeding unless pod feeding is observed. If 10% of the pods on the plants have feeding injury and the beetles are still active in the field, a spray is warranted. Days-to-harvest intervals should be considered before spraying.

Making Hay In A Bullish Grain Market – Stepping Up Our Game

by Joel Bagg, Forage Specialist, OMAFRA

There is a great deal of optimism out there amongst cash croppers, as markets flirt with $6 corn and $12 soybeans. Side effects of this bullish market are higher fertilizer prices, increased demand for corn and soybeans land, and higher land rental rates. How will this impact our ability to produce profitable forages? What production strategies can we use to maintain our competitiveness?

High Fertilizer Prices

Fertilizer prices peaked about 2 years ago at what seemed to be unaffordable levels, but then declined as the economy softened. However, prices are on their way up again. While prices are very volitile, this spring many of us could be paying in the neighbourhood of $600/T for urea, $825/T for MAP, and $700 for muriate of potash, plus application costs.

Forage crops remove a lot of nutrients and therefore have high nutrient requirements. With an alfalfa-grass mixture, the typical amount of phosphorous and potassium (P & K) removed per tonne of hay harvested is equivalent to about 14 lbs (6.3 kg) of P_20_5 and 61 lbs (27.7 kg) of K_2O. Therefore the value of the removal is currently close to 2.0¢ / lb ($44 / tonne) of dry hay harvested. As an example, assuming a mixed stand with a modest yield of 3.2 tonnes per year, hay will remove about 46 lbs (20.1 kg) of P_20_5 and 193 lbs (87.5 kg) of K_2O, with a value of almost $140/acre.

Without replacing P and K with manure or commercial fertilizer, the soil test will drop quickly. Assuming that it takes about 35 lbs/ac of P_20_5 and 20 lbs/ac of K_20 to move the soil tests by 1 ppm on some soils, after only 4 years the P soil test could drop by 5 ppm and the K by 38 ppm. At lower soil test levels, this is commonly referred to as "soil mining" and is not sustainable. Low soil P and K fertility significantly reduce forage yields. The short and long term costs of poor fertility are much higher than the cost of the fertilizer.

Soil Analysis

Maintain reasonable P and K levels. Low fertility will significantly reduce the productive longevity of a stand. Higher fertilizer prices require targeting your fertilizer applications more strategically. Use a recent soil test to guide fertilizer applications. If the K soil test of the field is below 120 ppm, you can expect a yield response from top-dressing potassium. (http://www.omafra.gov.on.ca/english/crops/pub811/3fertility.htm)

Nutrient Recycling In Manure

Livestock producers have an advantage in maintaining soil fertility where manure is available to apply during the rotation. The best option is still to spring apply manure to corn crops in the rotation. However, there are some potential advantages to applying liquid manure to forage crops, including yield and quality benefits, spreading the workload, reducing manure storage requirements, preventing soil compaction, and reducing environmental risk.

Need to Add Value to Marketed Hay

Hay producers that market hay off the farm need to consider the replacement cost of P and K removed in hay. They need to "add value" to their hay in the market place by producing a quality product. It just doesn't make sense to produce and sell $20 round bales when they contain almost that much value in P and K.

Livestock will still need to be fed. Can the market pay the kinds of prices required to reflect high land and fertilizer prices? I don't know, but if it doesn't there may be a lot of hay acres move to other crops.

Historically, standing hay has often been an excellent buy. The P and K removal alone means that the historic 1 - 2¢ / lb of standing hay is way under the mark today, even before considering an opportunity cost for land rental and amortized establishment costs.

Higher Land Costs

High cash crop prices are also driving up land rental rates as farmers compete for land. Many older hay fields are being rotated to corn and soybean to take advantage of the higher prices. Some of the more marginal fields may be improved with tile drainage. What will all this mean to hay availability and prices? Are we moving to an era when hay inventories are much tighter and prices are on the increase?

There is a wide range in land rental opportunity costs across Ontario, from well over $200 / acre to less than $20. Assuming a $120 rental rate for field that produces 3.6 tonnes of hay per year, the "land cost" portion would be about 1.5¢/lb ($33/tonne). On the other hand, poorer land (likely not able to grow corn or soybeans) renting for $25/ac and yielding 2.3 tonnes would have a land cost of about 0.5¢/lb ($11/tonne).

Increase Forage Yields by Shortening the Rotation

Where land costs are significant, forage cost-of-production (COP) can be reduced by increasing yields per acre. It's time to step-up our forage management by improved establishment and weed control, and by scouting for insects and disease. Let's give forages the same level of management that is given to other field crops.

Alfalfa yields are usually their highest the year following establishment, and then gradually decline with stand age due to disease, loss of vigour and plant thinning. By the 4th year following establishment, yields can often decline to about 75% of the maximum yield. The decline can be even more rapid and significant with aggressive cutting schedules. This yield loss wouldn't be tolerated in any other crop without doing something about it, so neither should it be accepted with forages.

A strategy to manage higher land costs is to consider shortening the number of years of forage in your rotation, and using the legume nitrogen credit when rotating into corn. The optimum maximum age of an alfalfa stand will vary, but many stands suffer from "old age". Forage stands with greater than 50% legume content enable the grower to deduct 100 lbs/ac (110 kg/ha) of N from the following corn crop's N requirements. That is currently equivalent to over $60/acre, significantly offsetting the additional forage establishment costs. Stands that are one-third to one-half legume get a N credit of about 49 lb/ac (55 kg/ha). Research shows that in addition to the nitrogen credit, there is a significant yield benefit of alfalfa plowdown to corn of about 10 - 15%.

Establishment Costs Relatively Small

As an example, establishment costs using custom rates for machinery operations, herbicide and seed costs that total $165/acre in a 4 year rotation at 3.6 tonnes / acre, are typically about 0.5¢/ lb ($11/tonne) of hay. In many cases, this will represent only about 7% of the COP, far less than either fertility, land, harvest or storage. (Table 1)

Use Improved Varieties

While some farmers are reluctant to use improved forage varieties because of perceived high cost, forage seed actually represents a very small percentage of the total cost of producing forage. Seed costs of $63/acre (14 lbs @ $4.50) pencils out to only about 2.5% of the total COP. Using cheap seed is a poor strategy, particularly with high land costs. Buying "common seed" or varieties of poor or unknown performance is no bargain when considering the risk of lower yield or winterkill.

Improve Forage Quality

With increased costs and the importance of every forage acre counting, forage quality will be increasingly important. It just doesn't make financial sense to spend the money to produce the forage and then lose quality to weather risk, poor harvest management and lack of storage. Cut early to avoid losing nutrient quality to advanced maturity. Use hay drying and silage technology and management to prevent harvest losses. Remove bales from the field as soon as possible. Store hay under cover and off the ground to prevent spoilage. It may be time to reconsider building that hay storage that you need.

Summary

Higher hay prices, and higher land, fertilizer and input costs requires us to do the best we can to grow, harvest and store our forage crops for maximum yield and quality, with minimum losses. Some strategies include:

- soil testing and managing P and K fertility,
- increasing yield with improved forage establishment, weed control, insect & disease management,
- shortening forage stand age in rotations and using the N credit,
- using improved varieties,
- improving quality by cutting early, and using hay drying and silage technology,
- storing hay off the ground and under cover, and adding value to cash crop hay with quality, the right bale and marketing to cover higher costs.

Table 1 – Relative Costs Associated With Hay Production

	More Productive Land 4 Year Rotation 3.6 tonnes / ac / year		Less Productive Land 8 Year Rotation 2.3 tonnes / ac / year	
	cents / lb	$ / tonne	cents / lb	$ / tonne
Establishment costs	0.5	11	0.4	9
P & K removal	2.0	44	2.0	44
Land rental (opportunity cost)				
$120 / ac	1.5	33	n/a	n/a
$ 25 / ac	n/a	n/a	0.5	11
Harvest (cutting, raking, baling, etc)	2.1	46	2.2	49
Storage	1.0	22	1.0	22
less **N Credit**	-0.2	-4		
Total Costs	6.9	152	6.1	135

Notes

- return to risk & management not included
- custom rates used in establishment & harvest costs
- these are generalizations for comparison and discussion purposes only - use your own assumptions and calculations

Monitoring Early Crop Development

by Gilles Quesnel, Field Crop IPM Program Lead, OMAFRA, Kemptville

Challenging planting conditions could affect crop emergence and early development. Additionally, a significant portion of the corn and soybean acreage was planted with limited opportunity for pre-emergence herbicide application. These factors will increase the importance of early crop scouting and staging to assess stands establishment and determine proper timing of post-emergence herbicide application.

Stand Establishment

An easy way to calculate corn population is by counting the number of plants in 1/1,000 of an acre and multiplying the count by 1,000 to obtain the number of plants per acre. Table 1 lists the row length equal to 1/1,000 of an acre at various row widths. For standard 30 inch corn rows, count the number of plants in 17 feet, 5 inches of row and multiply that number by 1,000 to calculate the plant population per acre.

Table 1. Estimating Plants Per Acre Using Row Lengths

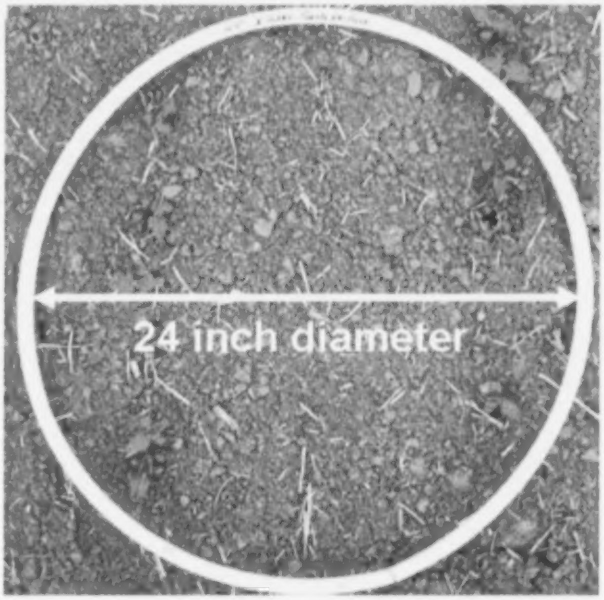
What's 1/1000 of an acre	
Row Width In Centimetre (inches)	**Length of Row Equal to 1/1,000 Acre**
38.0 cm (15")	10.62 m (34 ft., 10 in.)
50.8 cm (20")	7.97 m (26 ft., 2 in.)
76.2 cm **(30")**	5.33 m **(17 ft., 5 in.)**
81.3 cm (32")	4.98 m (16 ft., 3 in)

To determine plant population in narrow row crops such as 7 or 15 inch row soybeans, place a sampling frame with a known area on the ground to do the count. This is most easily done with a circular frame, either by making one out of plastic hose or using a Hula-hoop. The circular frame or hoop method is shown in Table 2. Using the hoop, determine the number of plants per acre by counting the number of plants found inside the hoop and multiplying that number by the predetermined factor for the diameter of your hoop, listed in Table 2. Figure 1 is an example of a 24 inch diameter hoop, where the number of plants (eg. soybeans, weeds, etc.) inside the hoop is multiplied by 13,865 to determine the number of plants per acre. Similarly, Table 3 lists plant population per acre for various plant counts using a 24 inch (61 cm) diameter hoop. Table 4 lists the plant count per foot of row for the different cereals planted in 7½ inch rows to obtain the target population (not counting tillers).

Table 2. Estimating Plants Per Acre Using A Hoop

Diameter of Hoop	Factor by Which to Multiply the Number of Plants Within the Hoop to Equal the Number of Plants per Acre
91 cm (36")	6,165
84 cm (33")	7,334
76 cm (30")	8,874
69 cm (27")	10,956
61 cm (24")	**13,865**

Figure 1: 24 inch hoop



24 inch hoop: # of plants X 13,865 = plants/acre

Table 3. Plant Population Using a 24 inch (61 cm) Diameter Hoop

Number of Plants Inside the Hoop	Plant Population (plants per acre)
3	41,600
5	69,300
7	97,000
9	124,800
11	152,500
13	180,200
15	208,000

Table 4 . Target Population for Cereal Crops Seeded in 7.5 Inch Rows

Crop	Plants per Foot of Row
Barley	14 to 21
Oat	12 to 18
Mixed grain	12 to 21
Spring wheat	18 to 23
Winter wheat	21 to 26

Regardless of the method used to determine plant population levels, at least 10 random counts should be taken in each field to determine an average.

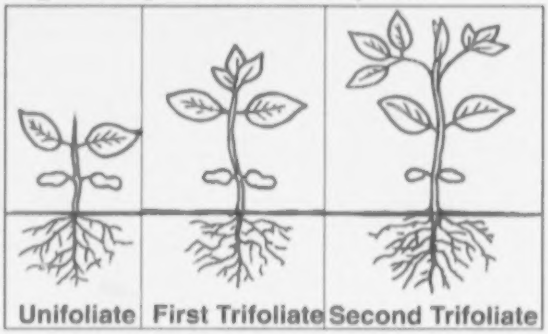
Crop Development & Weed Control

Accurate crop staging is essential to maximize the efficacy of a weed control. For crop safety, most herbicides need to be applied at a particular growth stage. Additionally, early in the growing season crops need to be kept weed-free for a specific growth period to minimize yield loss due to weed competition. The weed-free period, called "critical period of weed control" is the crop growth stages during which the crop must be weed-free to prevent a yield loss of more than 5% from weed competition. If weeds are controlled throughout the critical period, the weeds that emerge later will not affect yield and can be controlled prior to harvest, if necessary, with a harvest aid to burn down the weeds. The weed-free period is specific to each crop and can vary somewhat depending on weather, soil type, weed pressure and growing conditions. For example, the critical weed-free period will be slightly earlier in the growth stages for fields with light-textured soils under moisture stress conditions when weed densities are very high.

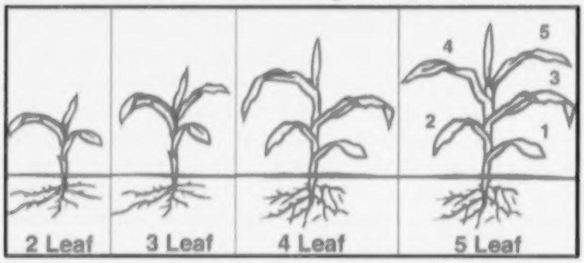
For corn, the critical weed-free period starts at the 3 leaf stage and extends to the 8-leaf stage of the corn. For soybeans, the critical period extends from the 1st to the 3rd trifoliate stage of soybean growth. Excellent weed control must be maintained throughout this critical period. In cereals, most broadleaf weed herbicides should be applied when the cereals are in the 2 to 5 leaf stage. In new forage seedings, most broadleaf weed herbicides should be applied when alfalfa, bird's-foot trefoil or clovers are in the 1-4 leaf stage and seedling forage grasses are at the 2-4 leaf stage. Refer to the label for specific herbicides.

Crop Growth Stages
(diagrams from the Agronomy Guide, OMAFRA Publication 811)

Stages of Soybean Leaf Development

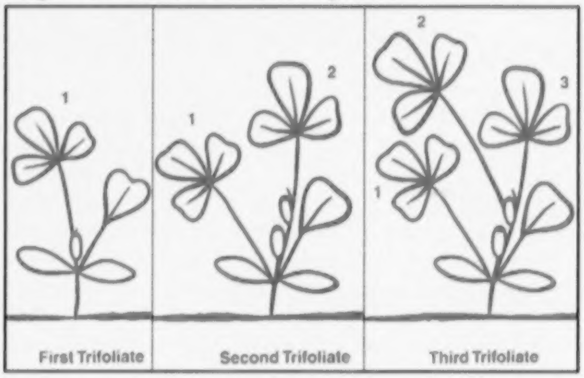


Leaf Over Method of Counting Corn Leaves

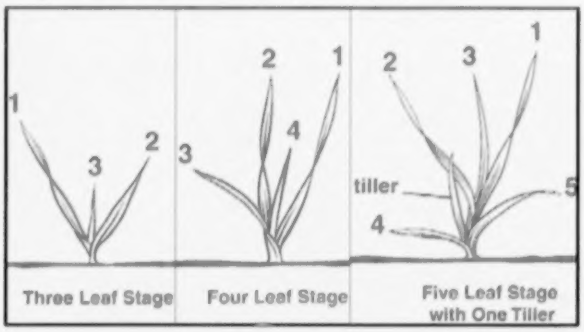


Only leaves that are fully emerged and are arched over are counted.

Stages of Alfalfa Leaf Development



Stages of Cereal and Grass Development



Economics of Manure Application

by Christine Brown, Nutrient Management Field Crop Lead, OMAFRA

The handling of manure is a cost associated with the livestock portion of the farm. Handling manure has many costs connected with it, including equipment purchase and maintenance, the opportunity cost of the time it takes to apply manure to fields, and the liability if something goes wrong and there is a spill. Additional costs may be incurred where the land base is limited and additional land must be rented, or in situations where manure agreements must be established.

Manure has value. Although mainly credited for its nitrogen (N), phosphorus (P) and potassium (K) value, manure is valuable for the organic matter additions to the soil (especially solid manure and higher dry matter liquid manures), and for the micro nutrients added.

N-P-K

The nitrogen, phosphorus and potassium content of manure have the most value when used in areas where soil fertility levels are lower. In these situations, there actually is a cost savings from not having to add commercial fertilizer. In fields where soil fertility levels are already very high, building additional soil fertility with manure will increase environmental risk. It will take many years before the phosphorus and potassium added by the manure will be utilized.

Organic Matter

The organic matter component of manure adds raw plant residues and microorganisms to the soil, which serve as a "revolving nutrient bank account" as well as an agent to improve soil structure and maintain soil tilth. The addition of manure helps to maintain soil organic matter levels, which improves soil moisture holding capacity and nutrient uptake by the crop.

Most soils in Ontario have a soil organic matter level in the 2 to 5 percent range. Decomposition and mineralization of nutrients from that range will release an estimated 40 to 80 lbs of nitrogen per acre per year. By maintaining the soil organic matter level with the long-term use of manure, it adds the additional value of soil health as well as a potential reduction in crop nitrogen requirement.

Manure Economics Worksheet

This worksheet compares the cost of commercial fertilizer application to manure application using average hog manure analysis. Nitrogen application is based on recommendations, while phosphorus and potash application meets crop removal levels. In the spring of 2011, the average cost of commercial fertilizer approximately:

N $0.55/lb	P_2O_5 $0.70/lb	K_2O $0.50/lb

Average Provincial Custom Work Rates

Fertilizer Application	Cost $ /ac	Cost $ /hr
Custom Spread Dry Fertilizer	8	261
Rental of Dry Bulk Applicator	9	14
Anhydrous Application	14	189
Liquid Sidedress Application	11	205
Tillage Operations	**Cost $ /ac**	**Cost $ /hr**
Moldboard plow	24	111
Chisel/Soil Saver	20	160
Disc (primary – secondary)	16 - 14	168 – 185
Cultivate	12	203
Inter row cultivation	11	190
Rotary hoe	8	193

Provincial Average Cost of Manure Application

Spreader Type	Average Cost	
	$ / 1000 gallons	$ / hour
Solid Loader only	---	$ 67 (range 50-85)
Solid Spreader only	---	$ 93 (range 65-135)
Solid loader and spreader	---	$ 127 (range 80-190)
Liquid Drag hose boom applicator	$ 7 - 10	---
Liquid Drag hose - injected	$ 12	
Liquid Tanker – surface applied	$ 9	$ 127 (range 90-150)
Liquid Tanker surface applied + incorporation	---	$ 195
Liquid Tanker – knife injection	$ 13	$ 165
Truck transfer	---	$ 110

Source: 2009 Custom Farmwork Rates Charged in Ontario

WORKSHEET- MANURE VERSUS COMMERCIAL FERTILIZER

Example

Corn Yield Goal: 175 bu/ac
NPK applied 160 lbs N
60 lbs P_2O_5
50 lbs K_2O

Method 1: Commercial Fertilizer:

	Cost/acre
Fertilizer through Planter:	
115 lbs MAP	$41.40
Liquid fertilizer	$ 0
Additional fertilizer	
150 lbs N (as 28%)	$75.00
150 lbs K (once/3 years)	$24.50
Application costs	$ 13.67
Total Cost	**$154.57**

Method 2: Manure Application

Equipment:
3000 gallon tanker with 30 ft spread-width covers 6 acres per hour) + cultivator

Application Rate: 3000 gallons/ac liquid hog

Analysis 80 lbs N
71 lbs P_2O_5
57 lbs K_2O

N-P-K Value $ 120
Organic Matter Value $?

	Cost/acre
Cost of Application:	$ 33.00
Additional fertilizer: 80 lbs N (as 28%)	$ 40.00
Application costs:	$ 11.00
Total Cost	**$ 84.00**

Net Value of manure = $120 - $84 = $36/acre

Your Situation

Yiel d Goal: ________bu/ac
NPK applied ________lbs N
________lbs P_2O_5
________lbs K_2O

	Cost/acre
Fertilizer through Planter:	
______lbs______	$___________
Liquid fertilizer	$ ___________
Additional fertilizer	
______lbs______	$___________
______lbs______	$___________
Application costs	$___________
Total	**$___________**

Equipment:
____
____

Application Rate: ____________________

Analysis __lbs N
__lbs P_2O_5
__lbs K_2O

N-P-K Value $_________
Organic Matter Value $_____

	Cost/acre
Cost of Application:	$___________
Additional fertilizer: ______lbs N	$ ___________
Application costs:	$___________
Total Cost	**$___________**

Net Value $______ - $______ = $______

The further the field from the manure storage, and/or the less concentrated the manure, the higher the cost of application, and therefore the lower the net value of the manure. If the fields were far enough away that only 3 loads were applied per hour (ie. only 3 acres per hour), then the application cost of manure would increase to $54/ac and the net value of manure would decrease to $15/acre.

What Is The Future For Organic Food?

by Hugh Martin, Organic Crop Production Program Lead, OMAFRA

Forecasting the future is always tricky, but usually looking at history can be an indicator.

Historical Trends In Organic Food
Thirty years ago, organic foods and farming were mainly an ideology for hippies and the back-to-nature types, as well as a few farmers who had not embraced the transition to farming with chemicals. Organic food customers were a very small group.

Twenty years ago, spurred on by several food safety scares in Europe and North America, there was a lot of press about organic food and farming. While demand increased, the supply of organic food was very low. Organic food sales in North America were less than $1 billion per year. Consumers wanting organic food went to the farm or to health food stores to buy this niche product. Sceptics said it was a fad that would soon disappear. The recession of the early-1990's reduced demand, but there continued to be more demand than supply. The organic food industry kept growing at 20% per year for the next 15 years.

Ten years ago, there were organic food retail sales of $7 billion per year. While it was still only 1% of the total food retail sales, large companies started to take notice. The larger food companies purchased many of the successful small organic food companies. Organic food sales continued to grow at 15-20% per year. By 2007, organic food sales in the United States were close to $20 billion per year. Lack of availability was a barrier to faster growth. During the last decade, mainstream supermarkets started to sell organic brands and private label organic products. Core consumers still bought over 50% of the organic food sold, but mainstream shoppers were also attracted to it as it became more available.

Today's Consumers & Future Growth
In 2008 we had the recession. Sceptics thought that with reduced or uncertain incomes people would not buy higher priced organics. Organic foods experienced slower growth, but continued to grow 5% in 2009 and 8% in 2010. Over 60% of consumers now buy some organic products. Consumers, who now refer to themselves as 'eaters', have many reasons for buying particular food products. Price continues to be a barrier, but some organic products have come down in price, and many are comparable to other premium brand products. Eaters are empowered to be able to choose the type of foods that they want to eat and feed their families. Some prefer to buy foods that are free from "something". There are many concerns about pesticides, antibiotics, hormones or GMO's in foods. Some see organic foods as being more environmentally friendly. Some eaters just want to experiment and buy a new product.

Sceptics have pointed out scientific studies that show there is no difference between organic and conventional foods. Supporters have other studies to show advantages to organic.

It is estimated that in 2010 there were $29 billion of organic food sold in the USA and over $2 billion in Canada. In Europe, sales of organic foods are over $25 billion per year. Current estimates are that organic food sales will grow at an average compound growth rate of 13% per year for the next 5 years. Sales will double within about 6 years. I see no reason to doubt these estimates.

Demand Exceeding Domestic Supply
In Ontario in 2009, we had 716 certified organic farms with 115,000 acres of organic crops that produced a farm gate value of over $122 million. These numbers are all about 1% of the provincial totals. Compared to 10 years ago, we now have 50% more organic farms and twice as many organic acres, but retail food sales are 5 times what they were 10 years ago. 4% of all food and over 10% of all fruits and vegetables sold in the USA are now organic.

Organic foods have been around for several decades. They have weathered serious challenges from the economy and sceptics, and yet organic food sales have kept on growing. The issue is how we can meet the challenge of this extra growth in demand in Ontario. 75 - 85% of our organic food is currently imported, of which over 75% comes from the USA. Canadian eaters can either eat organic foods grown in Canada or from the USA and other countries.

This is an opportunity for Ontario agriculture to diversify markets. In most cases, organic production relies more on internal production skills and less on off-farm inputs. Challenges are great, but many organic farmers are very satisfied with the results.

Do We Need To Apply A Fungicide In Spring Cereals?

by Scott Banks, Emerging Crops Specialist, OMAFRA

May 2011 has been one of those wet starts to the growing season. Wet and warm weather provides good disease growing conditions. Disease pressure makes for poor spring cereal yields and grain quality.

Is Fungicide Always Warranted?
The question is, "when are fungicides warranted on spring cereals?" Timing application to the crop stage impacts the effectiveness of fungicides to suppress disease pressure, whether it is leaf, stem or grain disease. If the weather turns dry, fungicides may not be needed. It is always important to consider the weather conditions and potential disease pressure at the time of application.

Early Application?

Another question is, "with the wet weather this May, should an earlier application of fungicide be applied?" From past research and on-farm trials, the use of a fungicide for leaf diseases when there is disease pressure present at weed control timing (or when the cereals are in the 4 - 5 leaf stage), has shown only about a 1 - 2 bushel per acre yield increase.

Figure 1 – 4 leaf Cereal Stage (Zadok's 14)

Leaf Diseases at Flag-Leaf Emerged Stage

For oats and barley, the greatest yield response from leaf disease control is when the fungicides are applied at the flag leaf emerged stage. This stage is when the last leaf emerges from the stem before the head emerges (Figure 2).

Figure 2 – Flag-Leaf Emerged Cereal Stage (Zadok's 37)

Crown Rust In Oats

In southern Ontario, oats need to have a fungicide applied at flag-leaf emerged stage (Zadok 37) for leaf diseases such as **crown rust**. Leaf diseases can be very devastating to both yield and quality, since the genetic tolerance of most of the oat varieties has broken down (Figure 3). In a 2008 oat fungicide trial in eastern Ontario, there was a 20% yield increase with the use of a fungicide at the flag-leaf stage on a variety where the genetic rust tolerance has broken down.

Figure 3 - 2008 Fungicide Trial on Oats – Note lodging in unsprayed strips

In northern Ontario, leaf diseases are less frequently an issue. However, growers should scout their fields as the oats approach the flag-leaf emerged stage, monitor the progression of the disease in southern areas and be prepared to apply a fungicide if conditions are favourable for leaf disease development.

Fungicide Products For Leaf Diseases

There are several fungicide products available for control of leaf diseases in cereals. Tilt 250E, Bumper 418 EC, Stratego 250 EC, and Headline EC can be used for crown (leaf) rust. For other diseases such as leaf blotch, Quilt can also be applied. The retail price of the fungicides ranges from $9 to $14 per acre plus application costs.

Figure 4 – Beginning of Flowering stage of a Wheat Head – note pollen sacks

Fusarium Head Blight

For fusarium head blight (FHB) suppression, fungicides such as Prosaro and Caramba are most effective if applied when the cereal is at the 20% flowering stage (Figure 4 - the beginning of flowering in wheat) and proper nozzles are used.

The proper nozzle setup is the Turbo FloodJet, – alternating forward and backward nozzles to target the fungicide on both sides of the cereal head (Figure 5). On-farm trials have shown a 4 to 8 bushel per acre grain yield advantage and about a 30 - 50% reduction in the percentage of fusarium damaged kernels (%FDK).

Figure 5 - Turbo FloodJet – alternating forward and backward nozzle set up for fungicide application for FHB suppression.

More Information

For more information about disease control management strategies and available fungicide products refer to A Field Guide to Cereal Staging, OMAFRA Publication 811, Agronomy Guide (p. 252) (www.omafra.gov.on.ca/english/crops/pub811/14cereal.htm) and Publication 812, Field Crop Protection Guide (p.52-81) (http://www.omafra.gov.on.ca/english/crops/pub812/p812toc.html)

Drive, Learn & Share

by Ian McDonald, Applied Research Co-ordinator

Over the last few months, local Soil and Crop Associations have developed some great workshops. They encouraged their neighbouring "locals" to attend, and everyone has gained from the experience. Just a few examples of some of these events include the "Sprayer Clinic" held in Brant in March 2010, the "Combine Workshop" in Peel last summer, and the "MTO Workshop" in Brant this March, the Peel SCIA Compost Tour and the Soil Fertility Workshops held at various locations across the province late this past winter. Everyone who attended these events gained from the knowledge extended and the discussion with new and old contacts. (http://www.ontariosoilcrop.org/en/events.htm)

OSCIA Coming Events List Server

Despite the cost of driving these days and the time it takes, I want to encourage farmers to take advantage of these learning opportunities. Car pooling with some neighbours shares the cost of fuel, and also provides a great opportunity to discuss the learning's on the way home. To keep abreast of events that you might find interesting and useful, you should be receiving by e-mail the OSCIA events list server maintained by Neil Moore. For example, a recent e-mail post of new coming events included the "Soil and Water Management Workshop" in Bradford on June 22nd, "Victoria County Sprayer Clinic" with Helmut Spieser of OMAFRA on July 11th, and the "Thunder Bay Agricultural Research Station Open House" on July 26th. Contact Neil Moore at nmoore@lrytel.net to be added to the list server.

Diagnostic Days

"Diagnostic Days" are held at Ridgetown (July 7&8), Elora (FarmSmart July 14) and Winchester (July 19) each summer. OMAFRA and University of Guelph staff bring you sessions that challenge current thinking, training you to identify and solve problems, and raise awareness of new technology. With these 3 major events located strategically across the province, one is within a reasonable drive for the majority of Ontario farmers. http://www.diagnosticdays.ca/
http://www.uoguelph.ca/farmsmart/
http://www.omafra.gov.on.ca/english/crops/conferences/20110719.htm

Ontario Forage Expo

Farmers with hay or haylage in the mix will want to attend the Forage Expo. This provincial "Hay Day" is brought to you by the Ontario Forage Council and Wellington SCIA in partnership with the University of Guelph and OMAFRA. New hay and haylage making technology will be demonstrated. Mark your calendars for Wednesday July 13th at the University of Guelph's Elora Research Station. http://www.ontarioforagecouncil.com/programs/ontario-forage-expo.html

We look forward to seeing you out at these events. Further information is also available from the OMAFRA Agricultural Information Contact Centre at 877-424-1300.

Crop Residue Value

by Greg Stewart, Corn Specialist, OMAFRA

There is lots of talk these days about crop residue removal for bioenergy purposes. We have gone through the first wave of trying to make it very clear to those less familiar with agriculture that this crop residue has real value.

Crop Residue Value Components

Crop residue value hinges on a few components:

1. Crop residues are critical for maintaining the organic matter fraction of the soil. This in turn impacts everything from yield potential to water holding capacity, to resistance, to compaction.
2. When left on the surface or incorporated in shallow surface soil layers, residues are critical to prevent soil erosion.
3. Crop residues have value based simply on the nutrients that would be lost if these residues were removed from the field.
4. Value is attributed to residues based on the current price being paid for crop residues for traditional uses, i.e. straw for bedding, mushroom compost, etc.

So what are crop residues worth? The simple answer would be to pick up the phone and find out what someone would pay you for the wheat straw or corn stalks on your land. This would take care of item #4 above.

NPK Removal Value

Slightly more complicated is determining the value of the nutrients in the residue. Table 1 estimates nutrient concentrations in a tonne of corn stover, the fertilizer costs and the resultant fertilizer replacement value. At relatively modest fertilizer prices, the NPK (nitrogen, phosphorus, potassium) removal is valued at $22.73 per tonne of stover.

Crop Residue Value Estimator

The P and K values are straight forward. However, the N cost is more complicated. Should I really value the N in the stover, when in fact if I remove the corn stalks I may indeed lower my nitrogen costs the next year if I was to grow corn again? This leads us to the more complex issues that demand we consider:

- the value of the organic matter, not just the nutrients, and
- the long term impacts, not just next years budgets.

If you would like to evaluate the nutrient value in various crop residue scenarios, Ken Janovicek (University of Guelph) and I have put together a calculator for this purpose. The calculator allows you to look at different levels of crop yield, costs associated with residue collection, prices for fertilizer, etc. It also presents some assumptions that you may or may not agree with. The Crop Residue Value Estimator is hosted on the IFAO website at http://www.ifao.com/IFAO-SoilSustainability.html.

How Much Crop Residue Is Needed To Maintain Soil Organic Matter?

What are the key questions when considering the value of the residue as it relates to long term soil health, organic matter levels and sustainable productivity? How much crop residue does it take to fuel the organic matter furnace that exists in your soil? Organic matter is constantly being broken down by a variety of processes. Crop residues need to feed the cycle in order for soil organic matter levels to remain steady in an agricultural soil. The estimates for crop residue requirements are fairly wide ranging, depending on soil factors. However, a reasonable estimate is 10,000 kg/ha/year! That is 10 tonnes of crop residue (including roots) to keep soil organic matter levels from declining.

Crop Residue Availability

The University of Guelph evaluated crop residue availability (Table 2). On average, the crop residue produced in the corn - soy - wheat scenario was 11,575 kg/ha/year. If it takes 10,000 kg/ha/year to just maintain soil organic matter levels, the amount of crop residue you could remove without some impact on productivity would be quite small. Higher crop yields, manure additions, cover crops and tillage could all play a part in assessing the value of crop residue. However, it is clear that underestimating the amount of crop residue required for stable organic matter levels, may contribute to undervaluing the crop residues.

Table 1. Nutrient removal and values from 1 tonne of dry corn stover.

	Nitrogen	P_2O_5	K_2O	Total
Removal (kg/ha)	19	8	34	61
Removal (lb/ac)	17	7	30	54
Price of Fertilizer ($/tonne)	$500.00 (46-0-0)	$500.00 (11-52-0)	$500.00 (0-0-60)	
Value of Nutrient in Stover ($/tonne)	$8.51	$2.98	$11.24	$22.73
Price of Fertilizer ($/tonne)	$750.00 (46-0-0)	$750.00 (11-52-0)	$750.00 (0-0-60)	
Value of Nutrient in Stover ($/tonne)	$12.77	$4.46	$16.86	$34.09

Table 2. Total crop residue production (above and below ground components) from a three crop rotation. Estimates provided by Hilla Kludze et al., University of Guelph, 2010.

	Corn	Soy	Winter wheat
Grain Yield (bu/ac)	162	44	80
Total Residue (kg/ha)	17, 147	5, 658	11, 919